1.1 Multipoint Control Unit (MCU)

A. The MCU shall be capable of supporting (20) continuous presence HD Video Ports at 720P/30Hz resolution and (40) continuous presence ports at 480P/30Hz resolution.

B. The MCU shall be capable of applying IP QoS (DSCP) values to the packets entering the IP network. Individual IP QoS values shall be implemented by the MCU for each voice only call, voice / video call, and video call.

C. The MCU shall support Network Time Protocol.

D. The MCU shall support cascading through H.323 and SIP.

E. The MCU shall support H.323 and SIP standards-based video calls in the same conference at all supported resolutions, bitrates, screen layouts, and encryption levels.

F. The MCU shall support H.323 gatekeeper registration with configurable service prefix numbers, configurable H.323 RAS ports, and configurable signaling port.

G. The MCU shall support H.245 Tunneling.

H. The MCU shall fully support IETF SIP RFC 3261.

I. The MCU shall utilize H.323 and SIP call signaling protocols natively to the MCU.

J. The MCU shall support audio conferencing with telephony user over PSTN Gateway connection as well as H.323 and SIP audio devices for audio only calls.

K. The MCU shall support voice activated switching in both full screen and continuous presence mode. The MCU shall support this switching over H.323, ISDN, SIP, and any combination of these protocols.

L. The MCU shall support automatic translation between different bit rates from 56 kbps to 12 Mbps for video, audio codecs (G.711, G.722, G.722.1, G.729, and AAC-LC), video codecs (H.261, H.263, and H.264), and video resolutions (QCIF, CIF, 4CIF, 352P, 480P, 720P, and 1080P).

M. The MCU shall support both H.263 and H.264 video codecs for the presentation content channels (H.239). The presentation resolution and frame rate shall be adjustable.

N. The MCU shall support H.264 video channels up to 1080P for sending and receiving per ITU-T.

O. The MCU shall automatically select bitrate, frame rate, and image resolution for each endpoint which joins an MCU conference.

P. The MCU shall support far end camera control in both voice activated and continuous presence modes using H.281.

Q. The MCU shall be provided with H.239 support for sending and receiving multiple streams of video and presentation content on all ports.

R. The MCU shall be provided with H.235 AES encryption support at full maximum bitrates without affecting port capacity or other features. The MCU shall support blending encryption levels within the same call. The MCU shall support encrypted TCP/UDP signaling and media.

S. The MCU shall be fully configurable through a web browser. This browser interface shall support multiple levels of administrative user accounts.

T. The MCU shall support IPv6.

U. The MCU shall be provided with two physical NICs. One NIC shall be used for management and one shall be used for IP traffic.

V. The MCU shall support TLS for connection to SIP devices. The MCU shall also support SRTP media transmission. These features shall not affect MCU port capacity or other features.

1.2 ISDN Video Gateway

A. The ISDN Gateway shall support (2) ISDN PRI T1 / E1 Lines with a capacity of (60) voice calls, (30) video calls at 128 kbps, (10) video calls at 384 kbps, (4) video calls at 768 kbps, and (2) video calls at full E1.

B. The Gateway shall support an open API based on SNMP.

C. The Gateway shall support the H.263 video codec for the presentation content channel (H.239).

D. The gateway shall support H.323 over IP and H.320 over ISDN.

E. The gateway shall support all bit rates from 56 kbps to 12 Mbps for video, audio codecs (G.711, G.722, G.722.1, G.729, and AAC-LC), video codecs (H.261, H.263, and H.264), and video resolutions (QCIF, CIF, 4CIF, 352P, 480P, 720P, and 1080P) in any combination while maintaining the highest quality for each endpoint within the same call in all modes while in an MCU call.

F. The Gateway shall be fully configurable through a web browser. This browser interface shall support multiple levels of administrative user accounts.

1.3 H.323 Gatekeeper

A. A software based H.323 gatekeeper shall be provided with a dedicated rack-mounted server PC. The PC server shall meet or exceed all requirements for the gatekeeper software.

B. The H.323 gatekeeper shall support the ITU-T H.323 version 4 protocol including all mandatory and optional gatekeeper functions.

C. The gatekeeper shall map transport IP addresses to E.164 phone numbers and text names / aliases for all registered endpoints, MCUs and gateways.

D. The gatekeeper shall support fully web based management and configuration with a configurable web server TCP port.

E. The gatekeeper shall support least cost call routing.

F. The gatekeeper shall support call forwarding options including: unconditional forwarding, forward – busy and forward – no answer, and forward when not registered.

G. The gatekeeper shall support user authentication using H.235 annex D.

1.4 Firewall Traversal

A. A hardware firewall traversal appliance (FTA) with (20) ports, upgradable via software and license key to (100) ports shall be provided.

B. The FTA shall fully support the ITU-T H.460.x firewall traversal standards.

C. The FTA shall have all non-necessary TCP and UDP ports and services disabled.

D. The FTA shall be remotely manageable through HTTP and HTTPS, secure shell version 2, and SCP/SFTP encrypted file transfer.

E. The FTA shall be compatible with all H.323 compliant gatekeepers and end points.

F. The FTA shall be compatible with any local firewall, far end firewall, NAT devices, and packet filters.

G. The FTA shall be fully transparent to all H.323 calls between the DCSC and outside participants.

1.5 Desktop Client VTC

A. A desktop client vtc software solution shall be provided. All necessary hardware servers and software shall be provided.

B. The desktop client shall be centrally deployed and managed. It shall automatically be installed via a downloadable plug-in for Windows and Mac OS.

C. The desktop client shall be capable of being installed without administrative rights on the user PC.

D. The desktop client shall be provided with free and unlimited distribution. There shall be no restrictions on who can deploy the client, and no license shall be required for each client.

E. The administrator can require desktop clients to authenticate in order to participate in a meeting. Single sign on / Windows authentication shall be supported.

F. A connection between two desktop clients shall not take any port on the MCU. The connection shall take place directly between the two desktop clients.

G. The control protocol for desktop clients shall be SIP and not H.323. The solution shall provide a simple NAT traversal mechanism based on STUN. An automatic fallback mode which connects two desktop clients to a server shall be provided in the event that a direct point-to-point connection is not possible.

H. The client shall adapt to the available bandwidth automatically at the start of each call. The client shall also adapt to any bandwidth changes during the call.

I. The client shall allow a third party to be invited into a direct call (via desktop client, phone, mobile or room system). In this case, the call shall be managed by the MCU automatically and transparently to the participants.

J. The H.264 codec shall support scaled video techniques and forward error correction.

K. The client shall be able to send and receive HD video at up to 1080P resolution.

L. The client shall be able to send and receive HD content at up to 1080P content.

M. The client shall have the ability to change between voice activated and continuous presence mode on the fly.

N. The client shall provide simultaneous views of the participant's camera feeds and H.239 content sharing. The client shall also provide full screen views of the participant's camera feed or H.239 content.

O. The client shall allow for annotation over the presentation. The annotations shall be sent as part of the H.239 stream.

P. The client shall allow the user to view previously presented content slides without disrupting the presenter or other participants. The presentation shall be cached on the server for the duration of the conference.

Q. The client shall include a component to allow text chat during calls.

R. The client shall allow a moderator to mute individual or all participants other than the presenter, disconnect participants, lock conferences so no one else can join in, and terminate a call.

S. The client shall allow a moderator to invite additional participants. The moderator shall have a list of favorite users and room endpoints, the directory, or can choose to invite a room or phone by number (via E.164, IP Address, or SIP URI).

T. The client shall secure conferences via PIN or passwords.

U. The client shall provide simultaneous broadcast / webcast of audio, video and H.239 presentations via streaming for higher scalability.

V. Webcasting shall be available in both unicast and multicast HD video up to 1080P. The client administrator shall determine which user receives a unicast or multicast steam based on their source IP address.

W. The client administrator shall be able to allow or not allow guests to access webcasts.

1.6 Mobile Client VTC

A. A mobile client for Apple iOS and Google Android platforms shall be provided. All necessary hardware servers and software shall be provided.

B. The mobile client shall offer a number to dial into a meeting audio conference or get called back to a specific phone number.

C. The content shared during a meeting shall be displayed on the mobile device regardless of the device used to present.

D. The mobile client shall allow the user to view previously presented content slides without disrupting the presenter or other participants. The presentation shall be cached on the server for the duration of the conference.

E. It shall be possible to invite any other participant to the meeting by dialing its IP address, E.164 or SIP URI.

F. The mobile client shall provide access to the company directory in order to invite another endpoint or user.

G. The moderator shall be provided with the ability to mute and unmute each user, mute and un-mute each camera, disconnect remote participants, change the video layout, change the placement of the participant in the video layout, and display statistics and call information.

H. The mobile client shall allow the following properties to be modified: start and stop streaming, start and stop recording, and lock the meeting to keep new participants from connecting.

1.7 Video Conferencing Management Suite

A. A fully integrated management solution including hardware server and software shall be provided. The web based management application shall control all system resources, reserve normal and recurring conferences, provide ongoing conference control, point to point calls, and network fault management. The application shall provide MCU management and control over the network through embedded API commands, H.225 / H.245, and SIP call control messages. The system shall be able to scale when additional MCUs, gateways, gatekeepers, and desktop servers are added.

B. All users shall be able to gain access to conference scheduling functions through the web based application. The application shall support multiple levels of user access privileges.

C. The web application shall implement single sign-on for the enterprise directory.

D. The scheduling application shall support intelligent and optimized real time resource allocation for MCU ports and dynamically reuse the allocated ports according to the actual end point capabilities.

E. The scheduling application shall include a Microsoft Outlook plug-in for scheduling from Outlook 2003 and 2007, to be installed at the desktop level, without modification to the active directory or Exchange server systems. The Microsoft Outlook plug-in shall be deployed as a Microsoft Installer (MSI) or COM object through standard software deployment tools.

F. The conference scheduling plug-in shall provide the following capabilities to the meeting organizer: Reserve a specific number of ports, set a moderator pin, set an access pin, set preferred location, set service profile, enable waiting room, enable streaming, automatically record meeting, ability to dial out to terminals once initiated.

G. The scheduling application shall support authorization and monitoring of point to point calls as wall as MCU conferences for optimizing bandwidth and network resource usage to assure high quality video conferences.

H. The scheduling application shall support management, load balancing, and resource reservation of multiple MCUs and Gateways.

I. The application shall support intelligent conference topology for bandwidth optimization based on terminals and network device locations, configured bandwidth, and relative delay between locations.

J. The scheduling application shall support SIP, H.323, H.320, and 3G/4G mobile users as well as desktop, mobile, and audio only terminals transparently.

K. The conferencing application shall provide a web based UI to modify and adjust meeting invitation emails.

L. A web based tool shall be provide to collect system logs, configure, monitor, troubleshoot system resources, delegate control, and provide ongoing management. The tool shall communicate over the TCP/IP network through API commands, SNMP, HTTP, and Telnet.

M. The network management application shall support forwarding of SNMP V2 traps and secure SNMP V3 traps to enterprise level SNMP tools based on device, type of alert and configurable thresholds.

N. The network management application shall support discovery of the manageable network devices present on the network.

O. The network management application shall support collection of network element status, including software version information, call status, endpoint, bandwidth, B-channel (ISDN), and current error or alarm conditions.

P. The network management application shall support the following functionalities of the existing Polycom HDX and VSX endpoints: Mass upgrades, mass configurations, remote reboot, basic monitoring, and general traps and alarm notifications.

1.8 Video Conferencing Recording Software

A. A fully integrated video conferencing recording, playback, and content management system including hardware server and software shall be provided. The system shall allow recording of all meeting content including video, audio, and presentations. The system shall be provided with the ability to record a minimum of (3) concurrent meetings in HD, with the capability to upgrade to (10) concurrent meetings.

B. The system shall be capable of recording and playback of video and presentations at resolutions up to and including 1080P.

C. The system shall include a content management portal for access to recordings. The portal shall support searching of recordings by name, conference ID, or other parameters.

D. The system shall allow for sorting of recordings by parameters such as name, conference ID, and duration.

E. The system shall allow for user-assigned categories for locating specific recordings.

F. The recording rights shall be determined by an administrator. Recording permissions can be tied to a user directory, allowing rights to be assigned to specific individuals.

G. Recordings shall be secured with both an administrative PIN and user PIN. The administrator PIN shall allow for modifications to the recording properties while the user PIN shall be required to access the recording.

H. The software shall support simple trimming of the beginning and end time of the recording.

I. The software shall support fast forward, rewind, and skipping to a specific time location in the recording.

J. Playback of recordings shall be capable on a Windows PC or Mac.

K. The end user shall be allowed to save recordings to a local drive.

L. The administrator shall be able to configure a different recording speed / resolution than the meeting call speed.

M. The system shall use standards- based storage systems rather than built-in proprietary storage.

N. The system shall not artificially limit the number of simultaneous playback connections for watching recordings.

O. The administrator shall be able to authorize or not authorize guests to watch recordings.